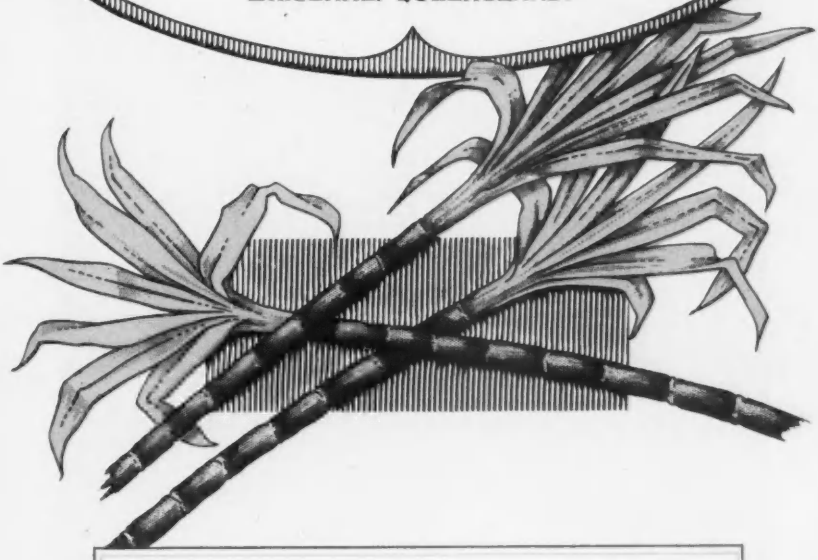
DEPARTMENT OF AGRICULTURE AND STOCK.

The CANE GROWERS' QUARTERLY BULLETIN

ISSUED BY
BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE. QUEENSLAND.



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SOILS OF THE BUNDABERG AREA.

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BUREAU OF SUGAR EXPERIMENT STATIONS
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CANE GROWERS'
QUARTERLY BULLETIN

ISSUED BY DIRECTION OF THE
HON. F. W. BULCOCK, MINISTER
FOR AGRICULTURE AND STOCK

1 APRIL, 1935

DAVID WHYTE, GOVERNMENT PRINTER, BRISBANE

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The
Cane Growers' Quarterly
—Bulletin—

VOL. II | 1 APRIL, 1935 | No. 4

Mules for Cane Farm Work.

By H. W. KERR.

IT would appear rather significant that Queensland is the sole tropical sugar-growing country where horses are the only animals employed for cane cultivation. Elsewhere mules are invariably preferred, and this applies even to the subtropical zones such as Louisiana. Most canegrowers will agree that summer conditions—particularly in the far North—are most trying for horses, and the average useful life of an animal in these parts is from 5 to 8 years. The vigour and hardiness of the mule, on the contrary, render it admirably adaptable for cane farm work, and the question of the breeding of mules specifically for this purpose is one which might be considered very seriously by canegrowers.

At the present time, a few growers are actually working mules on their farms. In general the animals are rather light in build, and cannot be regarded as the type one would select for the purpose; yet their owners are unanimous in their praises of the superiority of the mule over the horse. In comparison with the horse, he will live much longer, endure more work and hardship, require less attention and feed, is less liable to digestive disorders and disease, is more easily handled and capable of performing work in the hands of a poor horseman. Despite his eccentricities, he has many undeniable virtues; his ancestry offers such a confusion of alternate virtues and vices that to bring out his best qualities requires careful thought in both breeding and handling; but even horsemen who have approached the mule in a state of prejudice are forced to admire the animal which has no "pride of ancestry or hope of posterity." The mule does not like to be hurried or worried; to try to force him against his will is practically impossible. He must be understood and gently but firmly persuaded to do things out of the ordinary. He appears to be an animal of high intelligence, and what is frequently regarded as stubborness might also be interpreted as his ability to determine whether the effort demanded is beyond his capacity.

The mule is a hybrid, having a donkey for a sire and a mare for a dam. The reverse cross is less frequently employed. The mule will not reproduce, and it is therefore necessary to maintain both jacks and mares for the production of mules. Several distinctive types of donkey are recognised, and the suitability of the mule depends, naturally, on the selection of the right type of parents. For work in the canefields of Louisiana, the desirable mule is from 16 to 17 hands in height, and from 1,150 to 1,300 pounds in weight. The Catalonian donkeys, from the mountainous regions of Northern Spain,

are regarded in America as the best breed. They range from 14 to 16 hands, and are noted for their strong, clean bone. They possess unsurpassed style and action which are transmitted to their progeny. The Maltese breed is rather smaller, and of light bone; though they display remarkable vitality they are generally regarded as too small for our purpose. The Italian jack has been classed as practically worthless. The French jacks are the most valuable, and so great is the demand for them that few are exported, and they are sold at prices ranging from £200 to £400. They are noted for their size and strength, and range from 15 to 15½ hands in height.

America must be given pride of place as the world's leading mule-breeding country. The jacks employed might be regarded as a distinctive breed, as the result of many years of breeding and selection, but the foundation stock was largely Catalonian. It is usually considered that the present day American jack is superior to all others in his ability to produce the desirable type of farm mule. A good mule jack should be not less than 15 hands high, and possess plenty of weight, large bone with quality, style and action. Vigour and strength of constitution are indicated by a broad chest and large heart girth. The animal should have large, well-shaped feet.

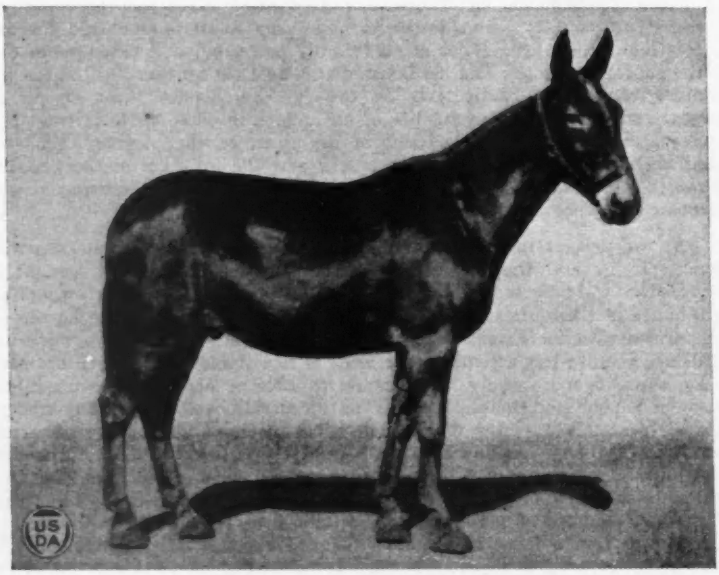


Fig. 13.—Illustrating a Good Sugar Mule as Employed in Louisiana.

Equal care must be taken in the selection of mares, for good mules cannot be produced from inferior animals. Mules from the heavy breeds are excellent for draught purposes, but cannot stand heat so well as those produced from mares having light-horse blood in their veins. For sugar plantation work, a mare with three-fourths heavy blood is generally regarded as most desirable. Above all, the mare should possess a vigorous constitution, and should combine size with quality, soundness and breediness. A breed which has found great favour in America is the Percheron mare; the animals are usually carefully selected for conformation and especially for their

docility. How mule-breeding would result with the usual Clydesdale mare employed in Queensland is a matter for determination.

Prompted by enquiries from certain Burdekin growers, steps were taken to ascertain the prospects of obtaining suitable breeding jacks and jennets from overseas, and for those who may be interested in the proposal, an abstract is presented which summarises the particulars that have been gathered. Through the Queensland Agent General in London it was learned that the cost of a good jack (14 to 14½ hands) in Spain, is about £140, English sterling. Allowing for shipping charges, attendant's fees and insurance, the cost of such an animal landed in Brisbane would be approximately £250, Australian currency. It would, of course, be necessary to import jennets at the same time, in order to maintain a supply of jacks. Advice was received that donkeys could be purchased in Cyprus for about £25 per head, but as these animals are only 13 to 13½ hands in height they would not appear to be of suitable type for producing heavy mules. In any case, the landed cost would be at least £100 Australian currency, and does not warrant further consideration.

The most useful and interesting information comes from Kansas, U.S.A., which is the centre of the mule-breeding industry of that country. From the Animal Husbandry Department of the State College it was learned that there is a plentiful supply of splendid jacks available in that State, and two of the leading breeders were requested to supply the desired particulars of what was available. The prices quoted varied from 300 to 1,200 dollars, for animals of proven capabilities with mares. They range in height from 14½ to 16½ hands and are bred from prize-winning stock; three of the best show jacks owned by one breeder were quoted at from 150 to 1,000 dollars.

It would appear that best results could be obtained by an importation of, say, 6 jacks and 3 or 4 jennets from Kansas. The landed cost of suitable animals would probably be slightly less than the estimate given with respect to the Spanish jacks. With the guarantees of soundness, productivity and general suitability which could probably be obtained through the Kansas State College, purchasers would have little to fear in respect of the animals acquired. It is possible also that arrangements could be made for an officer of the Queensland Agricultural Department, who will be visiting America, to carry out negotiations in this respect, if the project should be decided upon at an early date.

We would be glad to receive enquiries from any breeders (or farmers) who are interested in this matter; if two or three would each be prepared to undertake the purchase of an animal, arrangements for a shipment similar to that suggested could be made. Already two or three breeders have signified their intention of joining in the scheme.

Doubtless this matter is of more than passing interest to canegrowers; the much maligned mule probably offers the solution of the draught animal problem on the cane farm. Those of our farmers who saw service in France during the war days cannot speak too highly of the potentialities of the mule under the most exacting conditions. An animal that will thrive practically on chop-chop, give from 15 to 25 years of service, and be more than the equal of a horse in working capacity, merits serious consideration; and there is no serious obstacle to the production of such animals should a small group of farmers or breeders take the initiative as suggested.

A New Implement—The Gyrotiller.

By N. J. King.

IT is now some ten years since Storey invented the implement which he called the Gyrotiller. It was designed to complete all soil preparatory work in one operation, and leave the land in a suitable condition for planting. The completed outfit went even further and opened the drills in readiness for the plants. The implement was later manufactured on a commercial scale by the firm of John Fowler and Company, of Leeds, England. Our delegates to the International Conference of Sugar Cane Technologists in Porto Rico had the privilege of seeing one of these implements at work, and they reported favourably on its performance.

The full-sized unit is necessarily an expensive one, and is suited for work on an extensive scale only. In Queensland its use would be decidedly limited and uneconomical; but a smaller model which is now built by the same firm has definite possibilities. One of these implements was imported recently by Messrs. Gibson and Howes, Limited, for use on their Bingera Plantation. The accompanying illustrations give some idea of the construction of the implement, and of its mode of operation.

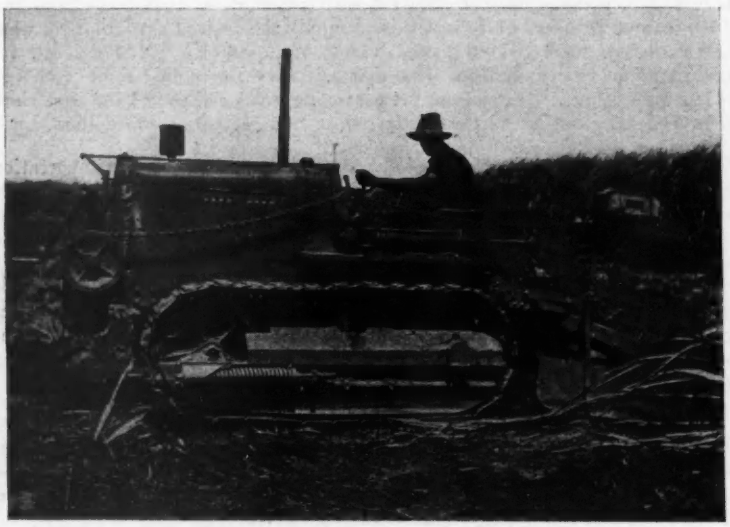


Fig. 14.—Side View of Gyrotiller.

It consists of a Fowler 4-ton Diesel Crawler Tractor with Storey Patent Gyrotiller attachment. The engine is of three cylinders, and develops 33 h.p. The attachment consists of two driven revolving heads (Fig. 16) each carrying 4 tines; the action of the tines is to stir and pulverise the soil to a depth of 14 inches, and the implement travels at a speed of 0.33 miles per hour. It cultivates a strip five feet six inches wide, and is able to cover an area of 2¼ acres in eight hours. Working to a lesser depth, the speed of operation is, of course, increased. The engine is equipped with

three forward speeds and one reverse. The tractor can be turned in its own length, and during the operation, the gyrotiller attachment is raised by means of a hydraulic lift. The attachment may be removed and the tractor employed for general purposes.

The implement has been operated successfully at Bingera during the past summer. In November the rotary hoe was used to chop out the stools, and the land was kept in bare fallow until January, when one treatment with the gyrotiller sufficed to put the soil into good order for immediate planting.

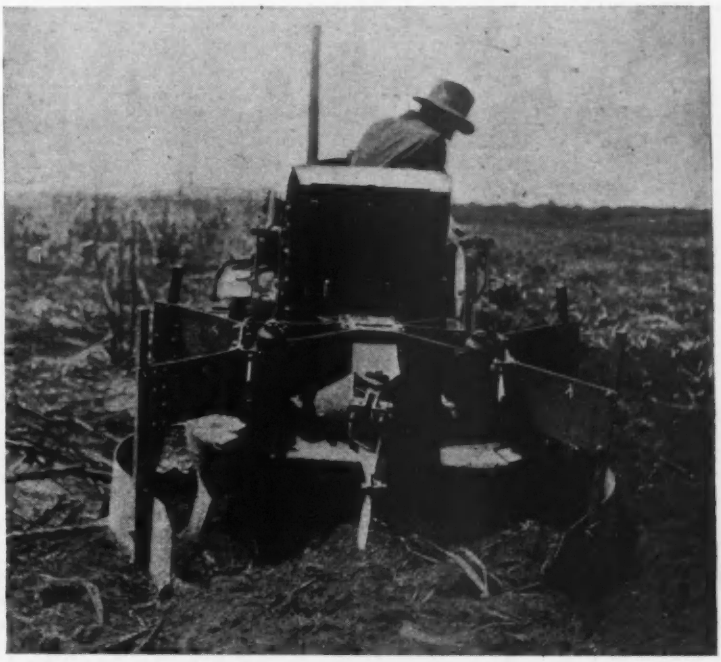


Fig. 15.—Showing the Implement Entering the Soil.

Certainly this implement presents features which are revolutionary, and should it prove successful, it will materially reduce land preparation costs. It is speedy in operation, and when the land is in suitable condition, the treatment is equal in its influence to at least two ploughings and harrowings. Unlike the plough, the implement does not invert the soil, and in this respect it functions as a satisfactory subsoiler; it stirs up the hardpan without bringing the raw subsoil to the surface. In rocky country, any serious obstruction shears off the tine holding bolts, so that no permanent damage is done. Stools, dead cane, or other refuse of this nature lying on the land surface, are brushed aside and do not interfere with the working of the gyrotiller.

On the other hand, the implement has certain decided limitations. Green manure crops or trash cannot be turned under with it; indeed, the action of the implement is to "plough up" rather than to plough under.

For the same reason, it does not make an effective job of ploughing out old stools. It does not permit of the weathering and mellowing of the soil by climatic agencies prior to planting, as is the case with plough preparation, and the net effect is essentially one of ploughing out and replanting. Though this is of little moment where heavy fertilizer applications are made consistently, and where the crop is produced by irrigation, it would require careful consideration under normal Queensland conditions. The gyrotiller

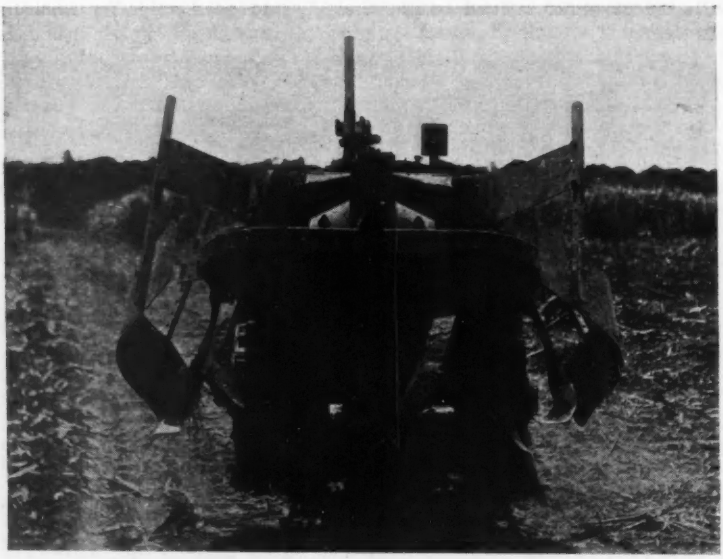


Fig. 16.—Showing the Tines Raised for Turning at Headland.

does its best work on a rather dry soil; where the land is somewhat moist, there is a tendency for the tines to lift, and the efficiency of the machine may be reduced by one-half. Again this factor is of little consequence on an irrigated plantation.

The Influence of Age on Maturity.

By G. A. Christie.

In previous papers presented to the Technologists Society correlations between age and maturity have been advanced, and in order to furnish data on this subject, a series of analyses was instituted during 1934.

To vary the age of the cane, several systems were possible, but that which was considered simplest and of more commercial importance was the comparison of autumn and spring plant canes, since the time of planting is generally under the control of the grower. It will readily be appreciated that variations in soil type, variety of cane and general growing conditions have a marked influence on the progressive and ultimate c.c.s. figure obtained. Therefore, it was essential to select both the spring and autumn plant cane of each variety growing under conditions which were comparable,

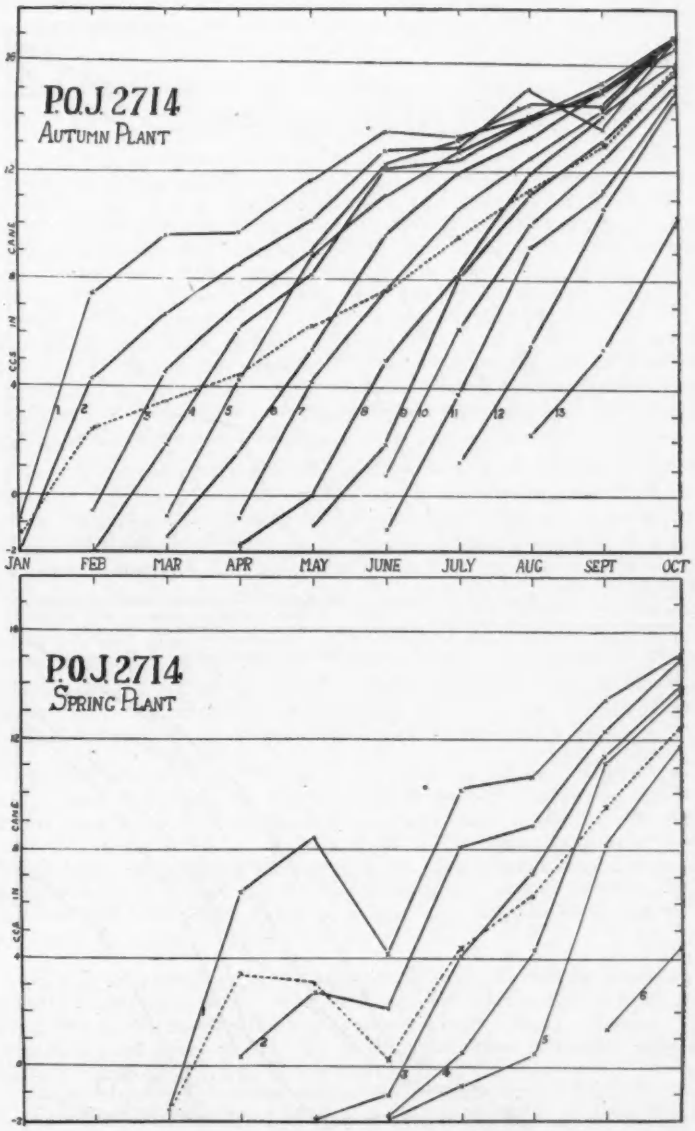


Fig. 17.—Results from P.O.J. 2714.

thus eliminating as far as possible, all variable factors except the age of the cane. Varieties selected were spring and autumn plants of P.O.J. 2714, Badila, E.K. 28, Oramboo, Korpi, all of which were under irrigated conditions, and P.O.J. 2878, Q. 813, which were grown without irrigation.

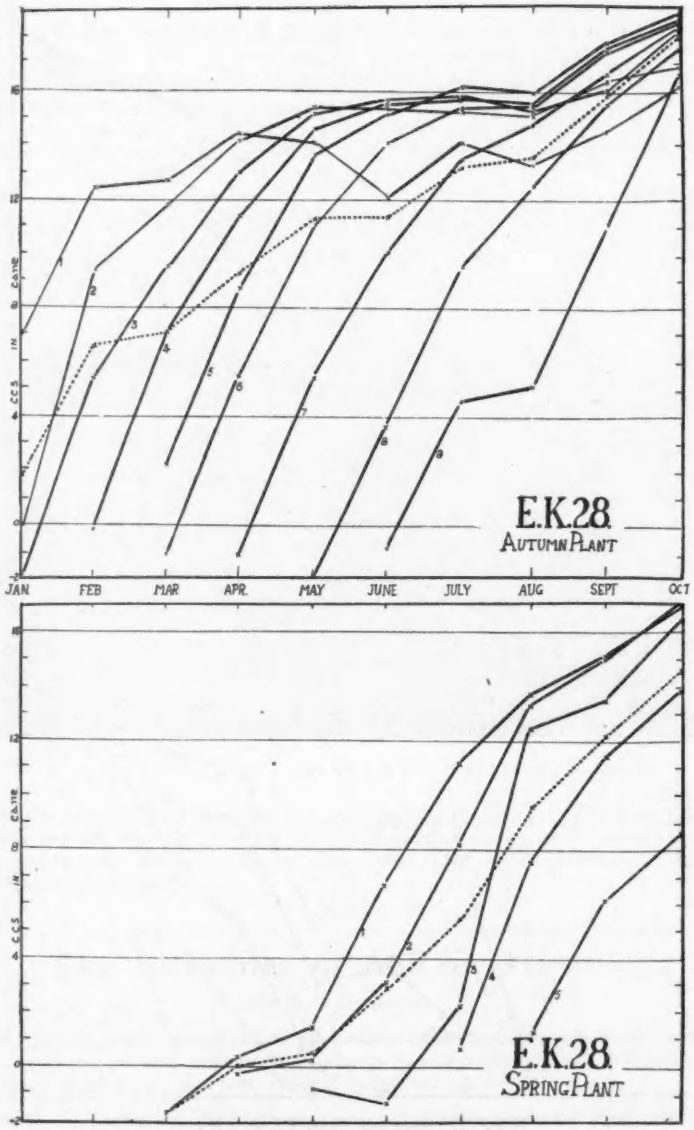


Fig. 18.—Results from E.K. 28.

In order to follow a uniform method of sampling, six of the more highly advanced sticks were taken from the selected fields at monthly intervals. These were stripped of trash to the last formed node, and, commencing at the

base, the sticks were cut into lengths of one foot; corresponding sections were composited and the several sub-samples thus obtained were crushed separately in the small mill, and the juice analysed.

In illustrating the results graphically, every continuous line represents the progressive c.c.s. from month to month of a definite section of the stick. For example, the c.c.s. of the foot of cane at the base of the stick is represented by a continuous line marked 1, the different points on this line representing the c.c.s. of this section at each monthly sampling. Other sections are treated similarly, the number ascending in numerical order with each individual foot from base to top of the stick. In the interval between sampling, the growth of cane often made it necessary to provide for one or two extra sections. Lines, commencing on the month of sampling when this extra growth was recorded, indicate the new samples. The juice from a full stick sample when analysed was found to be approximately equal to the arithmetical mean c.c.s. of the individual foot samples. This is probably inaccurate where the top constitutes a small proportion of the total stalk and is doubtless responsible for the apparent anomalies recorded later. The dotted line in each graph represents the average c.c.s. of each monthly sample calculated on this basis.

In a discussion of the graphs the data which were obtained from each necessitate individual attention. The steady progressive rise in c.c.s. of autumn plant P.O.J. 2714 may be contrasted with the spring plant of this variety, since the latter gives an erratic and more sudden rise as the cane approaches maturity. The growth of six feet of cane in the spring plant which at harvest gave 24 tons of cane per acre cannot compete in tonnage or c.c.s. with the phenomenal growth in the autumn plant of this variety when 13 feet of erect cane at harvest yielded 70.4 tons per acre. Another point worthy of mention is the marked decrease in c.c.s. in the spring plant for the June sample. This is probably due to conditions being favourable for growth, when two extra feet of cane were produced; this growth doubtless caused destruction of cane sugar, thus reducing the c.c.s.

In the case of E.K. 28 the earlier maturity of the autumn over the spring plant is obvious by following the dotted line indicating the arithmetical mean c.c.s. A similar feature is observed in Badila. It will be noted that the mean c.c.s. at harvest of the autumn plant is apparently slightly lower than that of the spring plant. This result must not be overemphasised by reason of the marked disparity in growth between the two crops and the error which is probably introduced in calculating the average c.c.s. with the spring planted cane.

It will be noted that in the autumn plant of the variety Oramboo, the majority of growth occured before April, and following a reduction in growth during the winter months the c.c.s. made a steady rise to maturity. As in the case of most spring plants, that of Oramboo shows an exceptionally rapid rise in c.c.s. though growth in this crop is again poor.

In almost all varieties of autumn plant the erratic c.c.s. from month to month of the lower sections of the stick will be observed. It is possible that sampling error may be involved in this irregularity, though the uniform results of the upper sections seem to disprove this. A more probable explanation is that the lower sections are more affected by conditions of soil moisture.

The accompanying table illustrates the earlier maturity of the autumn over the spring plant cane. The figures are the average of individual foot

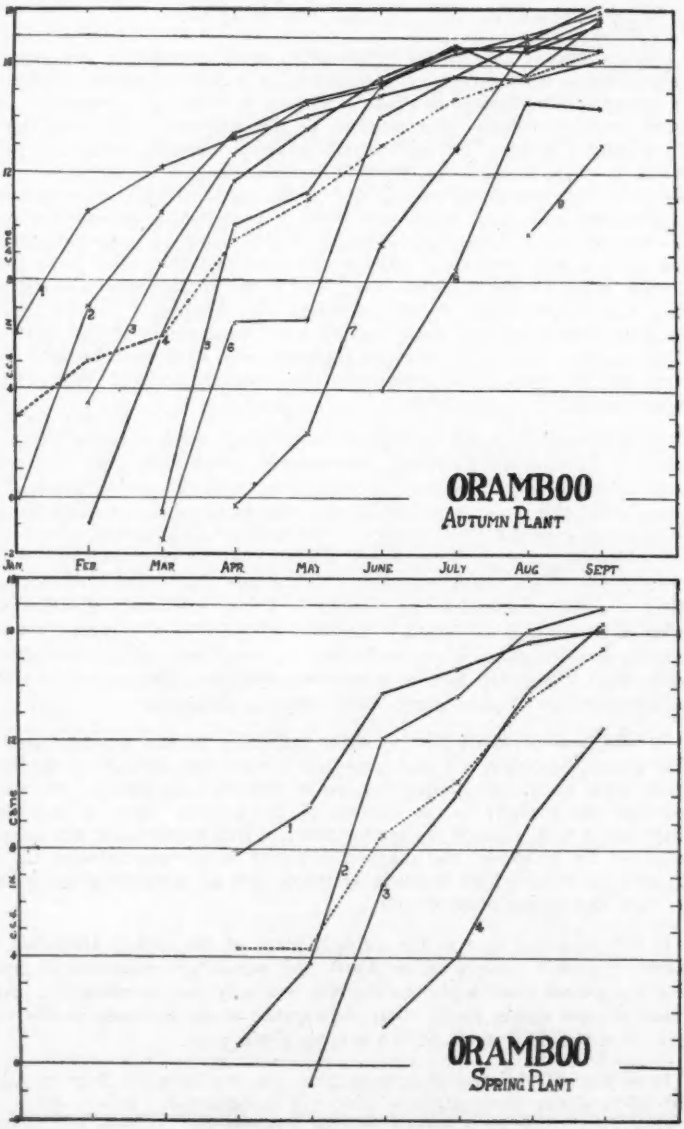


Fig. 19.—Results from Oramboo.

samples taken on the first of August, soon after the crushing season in the south had commenced:—

Variety.	C.C.S. on 1st August.	
	Spring Plant.	Autumn Plant.
	Per Cent.	Per Cent.
P.O.J. 2714	6·27	11·34
Badila	11·97	12·10
E.K. 28	9·73	13·70
Oramboo	13·99	15·77
Korpi	10·99	14·55
P.O.J. 2878	10·99	12·56
Q. 813	13·81	14·25
Average	11·11	13·47

The block graph gives an indication of the commercial aspect of spring versus autumn planting of cane. From the grower's point of view the tons c.c.s. as well as the tons of cane produced per acre are what interest him, since in Queensland payments are based on these figures. The upper blocks indicate comparative tonnages of c.c.s. produced per acre, the figure in the circle being the actual tonnage of spring and autumn plant canes respectively of the varieties mentioned beneath. Figures immediately beneath show the arithmetical average c.c.s. at harvest. The lower blocks and figures in circles indicate the tons of cane produced per acre. These figures require no comment since they speak for themselves. It might be mentioned, however, that the averages of spring plant compared with autumn plant on irrigated and unirrigated land, are as follows:—

——	Tons Cane per Acre.		Tons C.C.S. per Acre.	
	Spring Plant.	Autumn Plant.	Spring Plant.	Autumn Plant.
Irrigated	19·0	54·2	2·57	8·74
Unirrigated	21·7	44·4	2·69	5·87

In the spring plant, the higher figure obtained for unirrigated over irrigated cane, is explained by the fact that 1934 was a favourable year for the former. Unirrigated and irrigated canes were grown on different soil types. It should be mentioned that all spring plant crops were not harvested, and it was necessary to obtain an estimate of the crop from a reliable, unbiassed mill official.

One of the difficulties in South Queensland in the past has been the selection of suitable varieties for planting, which will be sufficiently mature to harvest early in the crushing season. Some varieties have proved suitable in this respect, though when cut early they often show poor ratooning characteristics particularly when cold, moist conditions are experienced. By the practice of autumn planting, varieties which are known to be vigorous ratooners but lack this early maturing characteristic when planted in spring, may be hastened in maturity and so provide a sufficiently high c.c.s. to make

their harvest profitable. During recent years the above difficulty has been partially obviated by the considerable amount of standover cane present in

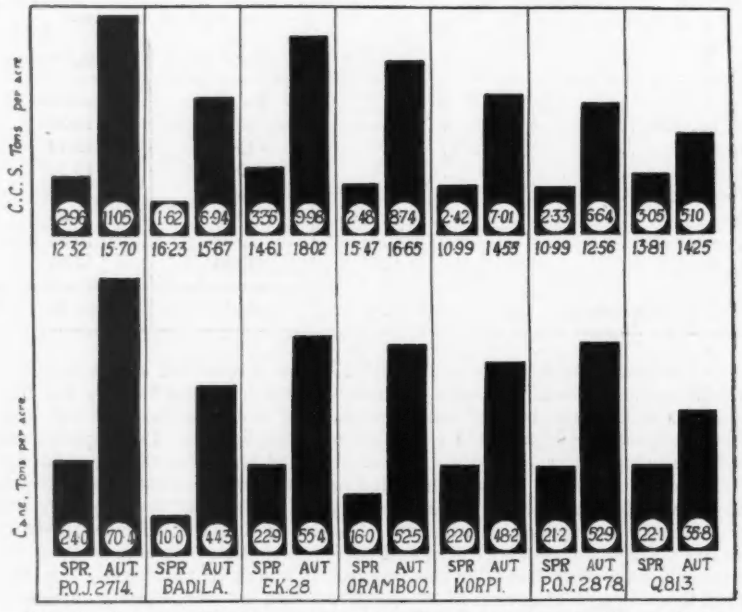


Fig. 20.—Showing Comparative Returns, Spring and Autumn Plant Canes.

each southern district, which provides a crop for early harvest. The higher c.c.s. usually obtained from such crops is again an instance of the influence of age on maturity.

Permits Necessary for the Transfer of Cane Plants.

The attention of cane growers is again directed to the fact that the Queensland sugar belt has been divided into nine sugar cane Quarantine Districts and a written permit must be obtained before cane may be sent from one such district to another for planting purposes.

The boundaries between these districts correspond approximately to lines drawn east and west through Cardwell, Townsville, Bowen, Alligator Creek (south of Mackay), Rockhampton, Howard, Hook Point (in the south of Great Sandy Island) and Brisbane. A permit is therefore necessary in order to send cane plants from the north of one of these towns to a point south thereof, and vice versa.

In addition to these district quarantines, local quarantines exist in the Mulgrave, Millaquin, and Maryborough areas, and the removal of cane plants from these areas is prohibited.

All requests for the inspection of cane for the purpose of obtaining a permit must be lodged with the Director, Bureau of Sugar Experiment Stations, Brisbane, before 30th June, 1935.

P.O.J. 2878 in Southern Queensland.

THE Java "Wonder Cane," though so disappointing in North Queensland, is rapidly becoming a favourite with farmers in the South. Its virtues are—rapid growth, excellent stooling, resistance to gumming disease, and ability to standover successfully. It possesses outstanding ratooning qualities, and is therefore highly satisfactory where trash rolling is practised.

Fig. 21.—An Excellent Crop of Standover P.O.J. 2878 at Childers.

Several large blocks of this variety were harvested in the Childers area during the 1934 season, and the accompanying photograph illustrates the class of crop produced. It was standover cane cut rather early in the season, and it yielded over 65 tons per acre at 14.2 per cent. C.C.S. As the longest sticks were only 12 feet, one may gauge the intensity of the stooling, and the "heaviness" of the stalks.

H.W.K.

Plant or Ratoon Cane for Planting?

Much discussion has centred around this important question. Some growers assert that they would plant nothing but ratoon cane, while others aver that they experience nothing but good results from plant. It is probable that the apparent disagreement lies in the failure of the two groups to introduce the question of soil and climatic conditions into the argument.

With the most favourable environment good strikes may be obtained from practically any class of plant, provided the eye is not damaged. But when the weather is dry and cool, and these unfavourable conditions persist for some time, it is most important that the class of plant employed be such that it will retain its viability until conditions favourable for germination are experienced. Immature canes with soft eyes will often dry out or rot.

In general, therefore, a well-grown first ratoon crop will provide a good class of plant for all purposes; but excellent results will also follow the use

of similarly grown plant cane. Standover crops, however, are usually responsible for unfavourable results, due to the lack of vitality of the eyes induced by age. Where they must be used, a preliminary soaking for one or two days will assist.

Many growers in North Queensland experienced unsatisfactory results with S.J. 4 strikes last year. Doubtless this was due to the immature nature of most of the plants used (plant cane), and the excessively wet (and hence unfavourable) soil conditions which followed planting. On the contrary, S.J. 4 has a reputation for speedy and excellent germination results. This was the experience where ratoon cane was used last year.

Trash Rolling.

IT is pleasing to note the increased attention which is being devoted to trash conservation in Southern Queensland. A usual practice employed is to "roll two rows into one;" that is, each alternate interspace carries a double layer of trash, while the balance remains bare, and is cultivated.

Fig. 22.—Showing the Influence of Trash on Ratooning.
Right, Q. 813; Left, P.O.J. 2878.

An important feature of the plan is the variety of cane which is grown. Before the method can be applied successfully—particularly where heavy cane crops are produced—one must be certain that the variety employed possesses such strong ratooning qualities that the bed of trash will not retard the germination and early growth of the ratoons. The illustration shows the comparative value of Q. 813 and P.O.J. 2878 in this respect. Each plant crop was of the order of 40-45 tons per acre, and a heavy body of trash resulted. The cane was cut early in the season, at which time it is known that Q. 813 frequently ratoons indifferently. The stand in the ratoons was still further hampered by the presence of the trash, and the joint influence of these two effects requires no comment. The cane to the left of the picture is P.O.J. 2878 which was ratooning strongly even before the trash had been removed, and its vigorous behaviour is characteristic of all the new P.O.J. varieties of gum resistant qualities which are now being propagated in these parts.

N.J.K.

The Giant White Ant.

By J. H. Buzacott.

TERMITES, commonly but incorrectly known as "white ants," are sometimes a source of trouble to canegrowers. Although a number of the smaller types of termite sometimes destroy setts in the ground, and on rare occasions growing stools, the so-called Giant Termite is the only termite of real economic importance. Fortunately this giant termite is a pest of cane only in the Burdekin district, but in certain localities, particularly on the fringe of the forest, it may destroy fairly large patches of standing cane. The termites bore into the base of the stalk and rapidly eat out the central flesh, leaving the rind intact. The fibres in the rind suffice to keep the leaves supplied with water and so the presence of the pests is usually not noticed until they eat right up to the growing point. "Dead hearts" then appear and on shaking such a stalk it is found to be weightless, while cutting and splitting show it to be hollow throughout its whole length.

The adult members of a colony of termites are divided into workers, soldiers, and winged forms with, usually, one queen; the worker is creamy white in colour and about half-an-inch long. The giant termite does not build a mound and the nest can only be found with difficulty as the termites proceed to the logs, trees, &c., which they attack, not above ground but through tunnels which may be upwards of 100 yards in length. The main nest often extends several feet underground.

The smaller types of termite can be controlled by treating the nests with carbondisulphide or by laying baits of pine treated with molasses and arsenic. In the case of the giant termite, however, the nests are not easily discovered and arsenic, although widely used, is not so effective. Infested trees, logs, &c., should be destroyed and molasses and arsenic baits used to protect fence posts. If a small patch of cane near a headland is attacked it is often advantageous to plough a short furrow along the headland, sprinkle a bait consisting of bran or sawdust mixed with molasses and arsenic along the bottom of the furrow, and then cover with soil.

Termites attack cane chiefly for the moisture obtained from it, but nevertheless they dislike very wet conditions; consequently, where irrigation is practised, frequent waterings in the vicinity of the attack will greatly reduce the damage. For the same reason, planting in spots liable to attack should not be carried out in dry weather unless the ground is well watered.

Despatch of Cane Samples for Test Purposes.

In certain southern districts where growers desire to forward bundles of cane samples to our Bundaberg Experiment Station, facilities for pre-payment of freight are not provided. In this event it is expected that the growers will reimburse the Station for the freight charges incurred; for the convenience of the farmer, we will be pleased to receive 1s. in postage stamps forwarded with a brief covering letter advising that the canes have gone forward. Unless this formality be complied with, the samples will not be accepted.

Salt Useless as a Grub Killer.

By R. W. Mungomery.

In the last annual report of the Bureau attention was drawn to the number of so-called grub "cures" which crop up like mushroom growths after each heavy grub infestation. Some of them have been resurrected time and again, and it is surprising how they persist without any apparent recommendation for their persistence, except possibly that Mr. X. tried a certain treatment against grubs last year. Whether his results were clear cut and obtained by means of a well planned experiment is usually not ascertained, and the fact that this treatment was tried is often sufficient reason for someone else to try the "cure" also. Salt was just one of the many grub-cures that were in vogue last season in North Queensland, and as there appears a faint possibility of its survival, a few cold facts concerning its past history may serve to put an end to a practice which undoubtedly represents a useless waste of time and expenditure of money as far as grub control is concerned.

The history of salt in its application to the soil as a grub killer extends over a number of years. It has been tried in Bundaberg, Mackay, and in the Cairns districts, but always without any effect whatsoever on the grub population. The late Mr. J. C. Brünnich, when chemist at the Colonial Sugar Refining Company's Homebush mill, applied a 10 per cent. solution of salt in water to grub-infested cane, soaking the soil surrounding the stools to a depth of 6 inches. Despite this heavy application the grubs remained apparently unaffected, but the treatment was reported to have had a detrimental effect on the cane's growth. This is in accord with what we would expect, as an over supply of salt has a poisonous effect on plant life. Moreover, if used in excessive quantities it has a detrimental effect on the physical condition of the soil.

Possibly the recent recurrent popularity of salt is due to a false deduction based on a single case in 1933. Two fields of cane, one late plant, and the other early plant, were growing side by side, the former having had a light dressing of salt applied to it, whilst the latter had none. The former was afterwards found to be practically free from grubs, whilst the latter was grub infested, and it was wrongly assumed that the salt had been instrumental in killing the grubs. Actually the true reason was that the early plant cane was much more advanced than the late planted cane at the time of the beetle flight, and so attracted greater numbers of beetles, with the result that the early plant cane suffered a much higher grub infestation. This greater attraction of more advanced cane occurs so frequently that it should have been obvious that this was the factor which had caused such a marked difference in the degree of grub infestation in the two blocks, and not the salt.

In all cases where salt was used last year the results proved disastrous. In one case where it was applied the cane began to show signs of distress in March, due to the unchecked activities of the grubs, and in the end these fields had to be fumigated to save the cane. In another case where salt was applied to a field under an approved experimental layout, there was no important difference between the salt-treated and the untreated rows of cane. *They all died!*

Growers are, therefore, urged to adhere to the approved methods of grub control and when in doubt concerning a new form of control which is being advocated, seek the advice of the entomologist of the Bureau.

Sugar Cane Varieties and Disease Control.

By H. W. Kerr.

THE origin of the sugar cane plant has been traced by various authorities to India and the East Indian Archipelago. Thence it has spread in early historical times, eastward to the islands of the Pacific and westward to the countries bordering the Mediterranean. The earliest records of the use of sugar show that it was an expensive luxury indulged in for its medicinal qualities; but by the middle ages it had assumed its rightful place as an article of common consumption, and we read that the trade in sugar was one of the greatest industries of that period. As early as the thirteenth century, sugar factories existed in Southern China, and the product could be bought freely at low prices. Columbus, on his second voyage of discovery to the New World, took with him sugar cane plants which were established in Santo Domingo, but it was not until the introduction of negro slaves from Africa, by the Spanish and Portuguese, that the cultivation of the crop in the West Indies became firmly established. Similar developments occurred in South America in the sixteenth century.

In the early years of the industry the culture of cane was necessarily restricted to a mere handful of varieties which had been introduced from the East. One of the earliest of which we find records was the Creole cane of India, which was later replaced early in the eighteenth century, by the superior Otaheite, also known as Bourbon, Cana Blanca, or Lahaina. Then followed a period in which diseases played a very important part in the prosperity of the industry. Otaheite succumbed to root disease, and was replaced by Cheribon, which in turn was decimated by Sereh disease in Java. Indeed, the history of the world's sugar industry in recent times is closely identified with the history of its varieties in relationship to their resistance or susceptibility to diseases. In 1915, an epidemic of mosaic disease in Puerto Rico threatened the extinction of the industry in that island, and Kavangire (a member of the Uba family) saved the situation.

The introduction of science into the industry was largely due to the near-calamity which befell the Javan industry in 1884. The spread of Sereh disease was so rapid that its control by any other means than the growing of resistant varieties became impossible. Where could the new varieties be found? Importations from all parts of the world yielded canes which, though more resistant than Cheribon, did not give adequate returns of sugar. In 1887, Soltwedel made the profound discovery that cane could be propagated by seed, and this opened up an entirely new line of investigation—that of producing new varieties which combined the virtues of high productivity and disease resistance. By introducing a certain hardy species of cane from India (Chunnee), it was found possible to effect this desired end. In addition, varieties could thus be produced which are particularly adapted to local conditions, and a wide range of choice was offered in canes of early and late maturity, canes for heavy or light soils, and those which flourish under wet or relatively dry conditions.

The fertility of cane seed was discovered independently by Bovell, in Barbados, in 1888. This new knowledge was readily availed of by all progressive countries, so that the older standard canes have been extensively replaced, in recent times, by superior seedlings artificially propagated.

In Queensland, the leading variety (Badila) is a natural seedling which was introduced from New Guinea at the close of the nineteenth century; but the balance of our major canes were artificially propagated by cross-pollination methods. Thus M. 1900 (Mauritius), B. 208 (Barbados), D. 1135

(Demerara), E.K. 28 (Java), are the direct result of such work. Q. 813 and H.Q. 426 were produced in Queensland—the former by the Queensland Acclimatisation Society, and the latter by Clark at Hambledon, North Queensland.

With the establishment of the South Johnstone Sugar Experiment Station, seedling propagation became a major project of the Bureau. As has been the case so frequently, the early efforts of our plant breeder were attended by flattering success. At least three of the first series (S.J. 2, S.J. 4 and S.J. 7) were varieties of distinct promise, but, unfortunately they lacked the degree of disease resistance which was necessary to render their propagation successful in any but selected localities. It was, therefore, evident that any new canes would be decidedly restricted in their usefulness unless they possessed the ability to resist the major diseases peculiar to the particular area for which they were intended. It was necessary to fall back on the carefully conceived and brilliantly executed plan followed by Jeswiet in Java. The results of this classical work are already too well known to demand repetition; and the late P.O.J. varieties which revolutionised production in Java and other cane-producing countries are a monument to the triumphs of science in agriculture. By combining the favourable characters of the high-yielding, sweet canes which are susceptible to disease, with the vigour and disease-resistance of the wild cane (Glagah), Jeswiet was able to eliminate entirely the losses from disease in Java. Importations of these varieties to Queensland has provided us with new canes of decided merit, and a selection of the best breeding material from that country has added appreciably to the value of the collection of varieties propagated in our breeding plot at Freshwater, North Queensland.

Unfortunately, Queensland can claim the unenviable reputation of possessing practically all of the known major cane diseases. This situation is the direct result of the policy of indiscriminately importing new varieties from all countries of the world, without regard to their condition of health. Indeed, before the true nature of certain of these diseases was appreciated, the appearance of what are now known as disease symptoms was then often accepted as a varietal characteristic! The difficulties of our plant breeder are therefore greatly increased by the multiplicity of these maladies. While a promising variety may be resistant to the majority of diseases, its failure to resist, say, gumming or leaf-scald, will completely exclude it from the selection of varieties which may be grown where such disease occurs. Further, the production of superior, disease-resistant canes is practically the only means at the disposal of the pathologist whereby disease elimination may be effected in an industry such as that of Queensland.

Until recent years, the most serious disease in this country was gumming. In the Southern areas of the State the presence of "gum" in canes has long been a most serious problem in sugar production, affecting both yields of cane and the manufacture of sugar therefrom. In its most aggravated form it has threatened the extinction of the industry in those parts on more than one occasion. Practically all desirable varieties grown in the area were susceptible, and growers were forced to turn to such canes as Q. 813 to save them from ruin. Although this variety possesses certain highly desirable qualities, in addition to that of disease resistance, it lacks those qualities of hardiness and vigour of growth which are so essential under the trying conditions characteristic of the South. Growers have, therefore, been loath to discard their old susceptible varieties, but so long as these are retained in their present state, hopes of disease elimination are vain.

Some six years ago the problem of supplying the area with high-yielding, gum-resistant canes was tackled in all earnestness by our Pathologist. This

entailed the process of subjecting all available varieties to rigorous trials, and only those possessing a very high degree of disease resistance were regarded as eligible for inclusion in further yield plots. Some hundreds of varieties from overseas were imported for this purpose, and the trials were usually continued over a period of two years to avoid false conclusions. In this way, the selection was rapidly reduced to a mere dozen or so varieties, and this number was further reduced due to unfavourable growth characteristics.

The first cane to show promise was P.O.J. 2878, the Java "Wonder Cane." To date it has displayed the highest degree of gum resistance of all canes tested, while its vigour of growth, drought resistance, and splendid ratooning qualities have gained for it a definite place in the planting programme of many southern Queensland farms. It has found decided favour where standover crops are desired. Next came P.O.J. 2725, Co. 290 and P.O.J. 234. In trials against Q. 813 as standard, they have consistently out-yielded the Queensland seedling, and they possess the characteristics of vigour and strong ratooning in a marked degree. As the "perfect" cane has not yet been bred, it is natural that these should possess their shortcomings. P.O.J. 234 is an early-maturer, which is a distinct advantage, particularly in areas where frosts are experienced; but it is small in barrel, and is highly susceptible to mosaic disease. For this latter reason it should not be grown on those lands where the spread of mosaic is rapid, and this is especially true of river flat country. Co. 290 is much superior to the earlier Co. varieties; the stick is of reasonable thickness, is low in fibre, and though the c.c.s. is not high, it must be regarded as satisfactory. Our tests to date show it to be free from starch. P.O.J. 2725 is also an early maturer, which frequently arrows freely and early. Early arrowing is not a serious drawback in an early maturing variety, however, and this cane is a most promising one for these parts. In common with all the latest P.O.J. canes, it is highly susceptible to Fiji disease, and its propagation must be guarded against in those areas where this disease is prevalent.

The following tabulation summarises the comparative yields obtained from farm varietal trials during the 1933-34 season; yields for plant and first ratoon crops (1932-34) at the Bundaberg station have also been included:—

Farm Trials.

Variety.	Alluvial Loam.	Red Forest Loam.	Red Volcanic Loam.	Brown Volcanic Loam.	Alluvial Loam. (Wet.)	Alluvial Loam. (Wet.)
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Q. 813	14·2	..	..	..	10·2	..
P.O.J. 2725	..	39·1	..	..	..	..
P.O.J. 2878	26·7	37·5	..	39·4	18·4	..
P.O.J. 234	27·8	30·5	27·9	38·6	19·2	31·3
Co. 290	37·1	39·2	37·2	48·7	24·7	39·7
M. 1900	..	28·3	..	..	..	..
P.O.J. 213	..	..	26·7	..	..	..

Experiment Station (Red Volcanic Loam).

Variety.	Plant Cane.	First Ratoons.
	Tons.	Tons.
Q. 813	9·3	20·4
P.O.J. 234	13·8	31·6
P.O.J. 2725	16·8	48·1
Co. 290	22·8	49·4

It may, therefore, be claimed that the southern areas are now provided with a selection of canes which will allow of the early elimination of the older gum-susceptible varieties. When this has been effected, disease-free stocks of the earlier favourities will again be provided, if they are desired; but it is anticipated that the selection of superior canes which will be available by that time will influence growers to turn against their old fancies. Certainly it is not contended that the canes now released are the last word as all-round performers. On the contrary, our early successes are driving us with more determination than ever towards the realisation of the "perfect" variety. Seedling propagation at the Bundaberg Station has undergone a rapid expansion in recent years, and the project will be extended to the limit of our capabilities in this respect. At present several promising new canes are under observation, but it is as yet too early to predict their future.

Variety Trial—S.J. 16 *v.* Badila.

AMONGST the early cane varieties bred at South Johnstone was a Badila seedling known as S.J. 16, which showed decided promise. It was discarded from the Station some time later due to its high susceptibility to red stripe (top rot) disease. Stocks of the cane had, however, been distributed for trial purposes, and claims were made by certain growers of the decided superiority of the cane on the red volcanic lands of Innisfail.

A trial was therefore set out on a red volcanic soil farm located at No. 6 Branch, South Johnstone. The comparative plots of S.J. 16 and Badila were planted in July, 1933, and soil conditions were ideal for germination. Badila gave practically 100 per cent. strike, while S.J. 16 was slow and indifferent, and it was necessary to supply misses. Throughout the growing season, Badila was definitely superior, though odd stools of S.J. 16 showed more vigorous stooling and quicker growth than the standard variety.

The South Johnstone seedling was seriously damaged by top rot. Counts showed between 25 and 30 per cent. of dead sticks in this variety, while in the Badila plots only odd shoots were killed by this disease. It was, incidentally, not the type of season which favoured top rot infection. The decomposition of the diseased stalks also attracted large numbers of weevil borer, and the millable cane was considerably damaged as a consequence.

All plots were harvested late in October, 1934; the average yields were:—

S.J. 16	...	18.8 tons per acre.
Badila	...	24.4 tons per acre.

The results of this trial indicate very clearly that the variety S.J. 16 is not suitable for these conditions.

G.B.

Questions Farmers ask about Fertilizers.

By F. Keogh.

FARMERS frequently ask many questions concerning the use and keeping qualities of artificial manures, and some of the more common, together with their answers, are given hereunder:—

Question (1).—If sulphate of ammonia is applied to the soil in dry weather, will it evaporate or deteriorate?

Answer.—This is an oft-repeated fallacy, due no doubt to the observed disappearance of the material if applied as stated. The effect is due to the ready absorption of the salt by the soil, aided even in dry weather by the night dews, or dissolved by a light shower of rain. The best rule to follow is—apply the manure when the crop is ready for it, independently of the state of the weather. It does not evaporate. Benefits will follow with the first shower of rain that falls.

Question (2).—Does fertilizer deteriorate or lose its value if stored from season to season?

Answer.—Fertilizer will store without any loss if kept in a dry shed. During the wet season it may absorb moisture from the air, and become quite damp. When the atmosphere becomes dry the moisture will be lost once more, causing the manure to set hard. It will require pulverising before use, but it has suffered no loss in quality.

Question (3).—Superphosphate contains 22 per cent. phosphoric acid; does the balance consist of filler?

Answer.—Superphosphate is a chemical manufactured from rock phosphate; it consists of the plant food phosphoric acid and the lime which was present in the original material, together with gypsum which is inevitably formed during the process. No impurity or filler is added. As the grower is concerned only with the amount of plant food in what he is buying, the seller quotes in terms of this ingredient.

Question (4).—Once fertilizer is used must it always be used?

Answer.—This is really the reverse of the true position. There are much better reasons why the farmer who has never used fertilizer should find it necessary to do so, owing to the depleted condition of the soil caused by continuous cropping. The man who uses fertilizer consistently has maintained the quality of his land. Certainly it is to the grower who has used fertilizer and then fails to manure a crop, that the difference is most striking; this may be interpreted by some as indicating that the land will grow cane only if the use of manures is persisted with.

Question (5).—Are fertilizers crop-stimulants which ruin the land?

Answer.—This question follows naturally on the previous one; again this is fallacious. Fertilizers add a supply of readily available plant food for the use of the crop, and in a soil which is depleted in fertility, the immediate results are often so striking that the grower fears he has done something which is bad for his land. The repeated use of a mixed fertilizer, with or without sulphate of ammonia, will not harm the land. In Hawaii, applications of 1½ tons of mixed manure per acre have been applied for each crop harvested over a number of years, and yields are improving annually.

On acid soils occasional liming is necessary to offset the acidic effects of sulphate of ammonia; no permanent damage to the soil is done, however, so long as lime is applied as required.

Ploughing in Trash.

Many ingenious methods have been devised to facilitate the ploughing in of trash and tops. One of the simplest and most effective is the attachment to the plough of a piece of spring steel for the purpose of flattening the trash and holding it in a compressed condition at the moment when it is cut by the disc.

Fig. 23.—Two-disc Plough with Spring-steel Attachments for Turning under Trash.

Fig. 24.—Results from the Use of the Above Device.

The attached photographs from the Cairns district show the operation of this device fitted to a well-known standard two-disc plough. Portion of an old car spring was employed in this case and an excellent job was done by both discs, as is evidenced by the condition of the ploughed land.

G.B.

Red Stripe Disease at Childers.

Farmers in the Childers area, particularly, have been somewhat perturbed at the appearance of red stripe disease (top rot) in the young spring plant cane. This disease has also been observed in places in the Bundaberg and Moreton districts.

Although of considerable importance in the areas north of Townsville this disease has never caused appreciable losses in the Bundaberg district, and it is not thought that there is any need for apprehension on the part of farmers. The organism which causes the disease is present in all our cane-fields and attacks the cane whenever climatic conditions are favourable. There need be no fear, therefore, that a new disease is making its appearance.

Our disease resistance trials have shown that P.O.J. 2875 and P.O.J. 2878 are the two most susceptible canes now being grown in the Childers area, but this is the first time the disease has become evident in these canes since they were planted in 1928. It is not likely therefore that the disease will ever attain considerable proportions.

The chief characteristic of the disease is the production of long, narrow, dark-red leaf streaks, which are more common towards the base of the leaf. The disease may not progress beyond this stage, or, on the other hand, it may cause an evil smelling top rot and bring about the death of the cane stalk. Any loss of stalks in this way, however, is compensated by the increased growth of the remaining stalks in the stool and it is safe to say that a 10 per cent. death of stalks in January will not cause any crop loss.

Young plant cane is the most susceptible crop and in North Queensland the disease may be almost completely controlled in Badila by early planting. The outbreak in Childers this year is no doubt due to the late planting of the cane (most of it having been planted after late September) followed by weather suitable for the development of the disease. In all probability the disease will not appear in these fields next year, and in any case it will be quite safe to cut plants from fields in which red stripe has been observed.

A.F.B.

When to Plough under Green Manure Crops.

This is a question which is asked so frequently that the answer will probably interest all farmers who follow this excellent practice. Soon after a bean or pea crop germinates, and develops its root system, those interesting little root bacteria gain entrance, and set up their colonies which occupy the peculiar little "nodules" so common on the roots of legumes. From the pea or bean crop these bacteria receive their foods, and in return they supply the host plant with the plant food nitrogen which they gather from the atmosphere. So long as the crop flourishes and puts on new growth, it is benefiting from the efforts of these little workers; and it may be assumed that the larger the crop, the greater is the amount of nitrogen gained in this way.

It is clear, then, that the farmer should aim at turning under his crop when it has reached the peak of its development. Further, he is generally anxious that the green material should rot rapidly to enable him to plant his cane within say—6 or 8 weeks. A crop in which the stems are woody does not favour rapid decomposition, so the legume should be ploughed down while it is still succulent. With certain species (notably Mauritius bean) it is highly undesirable that seed be allowed to mature before this is accomplished, or cultivation troubles will be experienced in the plant cane.

It may be taken as a safe guide that ploughing under when the seeds are in the milk stage will ensure satisfactory results. Where crop growth is retarded due to late planting or drought periods, it may be necessary to turn in a "half crop;" even in these circumstances the farmer may be assured that the benefits from the treatment are in proportion to the bulk of green manure added to the soil. A half-crop is certainly better than none.

H.W.K.

Farm Fertility Trial.

WHEN the results of the farm fertility trials for 1934 were published in January, the returns from Messrs. Ferguson Bros. experimental block were not available, owing to the prolonged harvesting season in that area. The results are now to hand and are tabulated below:—

Messrs. Ferguson Bros.' Farm, Airdmillan, Ayr.

Soil Type.—Alluvial loam. **Nature of Crop.**—Plant Cane.

Variety.—Badila. **Age of Crop.**—19 months.

RESULTS.

Fertiliser Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from extra Nitrogen over 120 lb. Sulphate of Ammonia.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
120	240	120	42·1	Average 15·1	2 10 0	..	..
240	240	120	46·4		3 4 0	3 16 0	..
360	240	120	46·5		3 18 0	3 5 0	..
480	240	120	51·6		4 12 0	7 18 0	..
600	240	120	50·8		5 6 0	6 7 0	..

DISCUSSION.

It will be observed that the treatments under consideration are those which we have employed in the Burdekin area during the past season. All plots were given a uniform application of superphosphate and potash, while five different sulphate of ammonia dressings were tested. The lowest application was 120 lb., and the highest 600 lb. per acre.

Although the results are somewhat erratic, they do show a definite yield increase up to the 480 lb. application. It would therefore appear that, on the older lands of this area, 4 cwt. of sulphate of ammonia per acre might be used with profit, applied in two or three light top dressings. This treatment should be preceded by a drill application of 3 cwt. per acre of Sugar Bureau No. 1 Planting Mixture, and at ratooning time a similar amount of No. 1 Ratooning Mixture should be applied in a furrow run close to the row. The benefits from sulphate of ammonia applied subsequently, to the ratoons, should be most outstanding on land of this nature.

Soils of the Bundaberg Area.

By N. J. King.

THE soils of the Bundaberg area may be divided broadly into three main types from the point of view of their origin and their chemical relationships. Each of these types may be subdivided as follows:—

Types.	Sub-types.
Volcanic	Red and brown
Alluvial	Recent and ancient
Sandy forest and scrub soils	Colour and texture variations

Each of these types plays a considerable part in cane production in Bundaberg and the adjoining districts and each will be discussed separately in the following notes:—

RED VOLCANIC LOAM.

The red volcanic type occurs on the site of the old Woongarra scrub, and at the Hill End section of Bingera. These soils are developed from basalt, and exhibit in Bundaberg the same characteristics peculiar to this soil type in other parts of the State. There is generally a considerable depth of soil (though the parent rock is close to the surface in some cases), and the soil is well drained and self mulching. An excellent crumb structure is one of its outstanding features, with the result that a good tilth is easily obtainable under most trying climatic conditions. Physically the red volcanic soil is the best cane growing land in the district, and with good rainfall—or under irrigation—appears to respond to treatment more rapidly than the other types; but for maximum results the moisture supply must be maintained at an optimum figure. The difference between the optimum moisture figure of this soil and that remaining in the soil when plant growth ceases is only 10 per cent. In other words the soil is able to retain 30 per cent. of moisture after rain, under good drainage conditions, but only 10 per cent. of this is available for the plant, the soil retaining the other 20 per cent. against the pull of the plant roots. Naturally, a considerable amount of this available moisture is lost by evaporation from the soil surface, and the 10 per cent. figure is thus further reduced. It is with the object of improving the available moisture supply in this soil type that trash conservation is being so strongly recommended. In the first place the trash lying on the surface, between rows of ratoon cane, prevents the loss by evaporation of a large quantity of moisture (for actual figures see Proceedings 1934 Conference); and secondly, the ploughing in of large bodies of trash after the final ratoons will result in building up the organic matter of the soil to something approaching its original value under virgin conditions. It has been established by laboratory determinations that the moisture equivalent of the virgin soil is 38 per cent., against the 30 per cent. figure for the adjoining farmed soil, the extra 8 per cent. being largely accounted for by the increased organic matter content.

The fertilizer requirement of the red volcanic soil has been well defined by years of successful experiment. It is known to be deficient in potash and nitrogen, and fairly well supplied with phosphates. Fertility trials on the Bundaberg Experiment Station and on farms in the district have almost invariably shown response to potassic fertilizers, the extent of the response being dependent usually on the seasonal conditions. In some cases in a year of good rainfall the principal response is from sulphate of ammonia. This is to be expected on all soil types if rainfall or irrigation water be plentiful and where the previous history of the block shows that potash

has been applied consistently. It is rarely that a marked response to phosphates is obtained on these soils. The original supply of phosphate is not yet depleted as the soils are in no case acid and leaching of phosphates is at a minimum. It is advisable, however, to keep up the supply by using a complete mixture. The fertilizer evolved for the purpose is Sugar Bureau Mixture No. 3, which is the mixture richest in potash yet put on the market.

A good example of the results of fertilizer trials on this soil type was that on the farm of Mr. P. Peterson at South Kolan. The results due to potash, sulphate of ammonia, and superphosphate applications, were as follows:—

——	Increase due to Potash.	Increase due to Nitrogen.	Increase due to Phosphate.
	Tons.	Tons.	Tons.
Plant Crop	4·9	0·7	0·4
First Ratoon	4·4	2·7	—0·3

The response to nitrogenous fertilizers in a good year is exemplified by ratoon trials on Windermere Plantation and Mr. H. C. Pressler's farm during the 1934 season. The former showed an increase, due to nitrogen, of 8.3 tons per acre, while the latter gave an increase of 6.5 tons. In neither case was a significant response obtained to superphosphate.

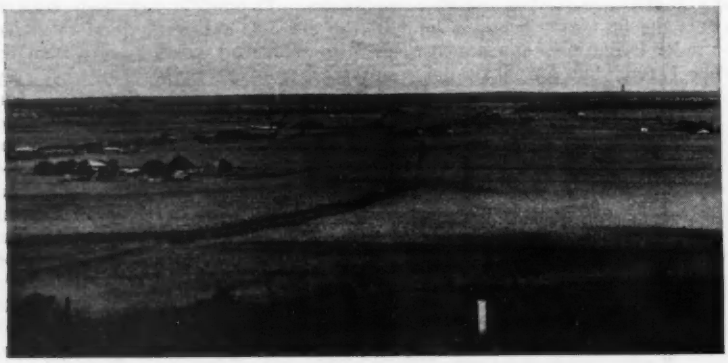


Fig. 25.—General View of Woongarra Red Volcanic Lands from The Hummock.

The droughty nature of the red volcanic soils is one of the principal reasons why the results of gumming disease are so serious in these localities. A prolonged dry spell lowers the vitality of the plant to such extent that death ensues more rapidly than on moister soils. The rapid spread of resistant varieties, however, will do much to eliminate this disease. The resistant varieties recommended for growth on these soils, under dry farming conditions, are P.O.J. 2878, P.O.J. 2725, Co. 290 and P.O.J. 234; if the land is being irrigated this list may be increased by the addition of Oramboo and Korpi in preference to the latter two.

BROWN VOLCANIC LOAM.

The brown volcanic soil which is found fringing the Woongarra and also occurring in isolated patches within the red loam is believed to be a wet

phase of the dominant type. It is significant that the brown soil is almost invariably found on the lower contours of the area. It is probably the better cane-producing land due to its more reliable moisture supply, but in its fertilizer requirement it does not seem to vary in any respect from the parent red soil.

ALLUVIAL SOILS.

The distinction between the ancient and recent alluvial soils of Bundaberg is not sharply defined. Most of the Fairymead Plantation lands are classed as ancient alluvials while the Rubyanna section is of recent origin. The older soils have been developed as the result of a flood plain, and are generally of finer texture than the more recent deposits.

Popularly these soils are considered to be rich in all plant foods. In most cases, soil analysis and field experiment show them to be fairly well supplied with potash and phosphates, although where these soils are of the lighter sandy type they are comparatively poor in all nutrients. It is a strange fact that very few farmers on the river alluvial lands grow green manure crops. When it is considered that these soils are usually deficient in nitrogen, particularly for ratoon crops, and that conditions are always very suitable for obtaining a green crop on the river lands during the spring and summer months, it is remarkable that so little green fallowing is practised. Very little, if any, autumn planting is carried out on these lands owing to their wet condition in these months and the probability of frosts in the winter. A nine to twelve months fallow is therefore always allowed, and it would be possible to grow and plough in at least two good crops of Poona pea in each rotation. The importance of this factor in successful cane cultivation cannot be too strongly emphasised, and the production of green manure crops in the future is worthy of every river farmer's consideration.

Bad drainage is an important crop limiting factor on the old alluvial soils, but on the more recent types the position is not usually serious. Isolated blocks show signs of bad drainage during seasons of high rainfall, and the influence of a high water table is rapidly reflected in the crop. Where such cases of bad drainage are serious the position can be greatly improved by opening drains at suitable positions across the contours of the block and allowing the excess water to flow into a main drain.

The fertilizer recommended for these alluvial soils is Sugar Bureau Mixture No. 1 used in combination with a top dressing of sulphate of ammonia, always for ratoons and also for plant cane where green manuring is not practised. The varieties recommended for the alluvial lands are Q. 813, Oramboo, Korpi, P.O.J. 2725, and P.O.J. 2878. It should be remembered, however, that the latter variety is late maturing and that it is not suitable for land where frosts are likely to occur. On the poorer class alluvials Co. 290 would undoubtedly be of value, but on good river soil the growth may be too rank to give a reasonable c.c.s. Oramboo and Korpi are giving excellent results on these soils so long as early cutting during cold weather is not practised; under these conditions ratooning is likely to be poor. P.O.J. 234 is not recommended for river lands; although it is early maturing, this variety is too susceptible to mosaic disease on soils where grass growth is serious.

FOREST SOILS.

The third major soil type of the Bundaberg area is the reddish sandy forest country of South Kalkie, Gooburrum, and Oakwood. This type varies considerably in colour and texture. Texture variations usually occur where this soil is contiguous to another type. At Bingera, for instance, every gradation of soil is obtainable from the reddish sandy type to the true red volcanic, and under these conditions the fertilizer requirement must be found

for each block by experiment. In the three areas mentioned above, however, the responses of the true forest type to fertilizer are similar. Superphosphate consistently gives larger crops, and the experimental results obtained from a number of field trials have been responsible for the composition of Sugar Bureau Mixture No. 1. A typical example of a trial on this soil type was that at Eardley Bros.' farm, North Coast road, where non-fertilized plots yielded 12.8 tons per acre and those with superphosphate cut an extra 6 tons per acre. With a crop increase of approximately 50 per cent. the claims for using phosphates on this soil type are highly justified. The P.O.J. canes and Co. 290 have been particularly successful in these areas. In a recent varietal trial at Oakwood, P.O.J. 2725 and Co. 290 yielded respectively 39.1 and 39.2 tons per acre as against 28.3 tons per acre from the standard cane M. 1900 Seedling. Each of the former varieties also exceeded the Seedling in c.c.s. value.

The appended soil map shows the approximate boundaries of the red volcanic soil and its brown sub-type, as well as portion of the river alluvial and reddish sandy forest soils of the immediate Woongarra area.

Trapping Beetle Borers.

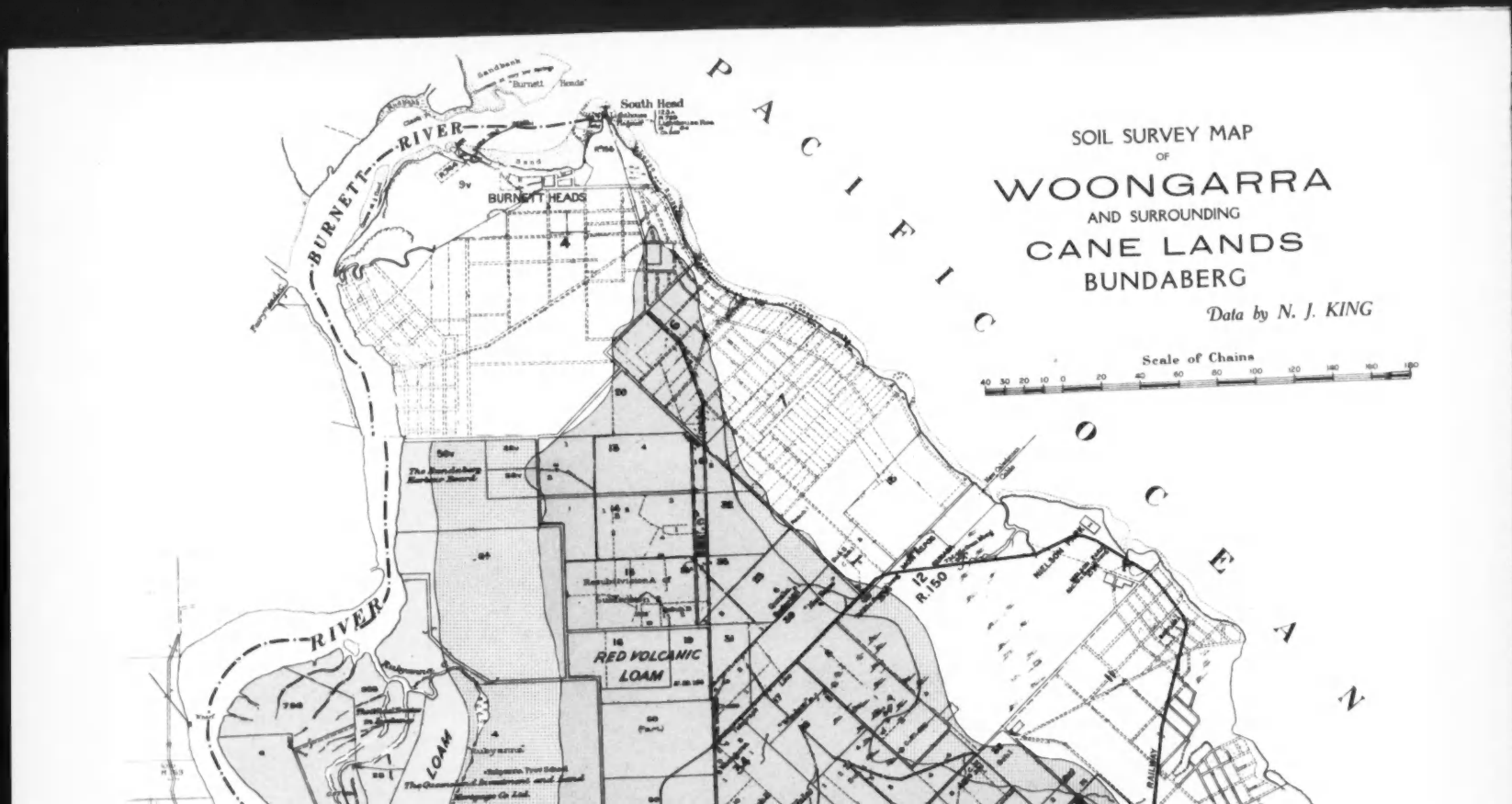
Northern farmers will recall that in the Quarterly Bulletin for October of last year (page 43) there appeared an article by Mr. J. H. Buzacott dealing with methods for the trapping of beetle borers. Following the publication of this article a small group of South Johnstone farmers headed by Mr. L. Ballini have undertaken a systematic trapping campaign. Traps consisting of split pieces of cane, laid on bags and covered with trash, have been set out on the headlands of adjoining farms and as a result of this season's campaign these farmers estimate that they have trapped over 150,000 borers. Mr. Ballini states that he is collecting about 1,200 beetles from his traps each morning.

During a visit to the farm, Mr. G. Bates, of the Bureau staff, collected 238 beetles from the traps and found that of these 138 were female and 100 were males. It is evident therefore that this small group of farmers is doing very excellent work and their example might well be followed by all who have been occasioned losses by this pest during the past season.

Intensive trapping campaigns which will produce results similar to the above are all the more desirable at the present time insomuch as the Tachinid fly parasite of the borer is seriously depleted in numbers. This unfortunate state of affairs is mainly the result of two causes, firstly the fact that circumstances last year required an extensive amount of burning of crops before harvesting, and secondly, the continued droughty hot weather which has been experienced this year. During a survey which was carried out in one mill area the presence of the fly parasite was recorded on only 50 per cent. of the farms at which it was recorded during a similar survey last year.

It has therefore become necessary for farmers in the far north to pay more careful attention to the provision of sanctuaries for Tachinid flies than has been the custom in the past. Care must also be exercised in the choice of the site of the sanctuary since it is necessary that the cane be well grown—that is to say dry patches should be avoided—but it must not be in a position where it will become overgrown and lodged. Particulars regarding the provision of sanctuaries, supplies of Tachinid flies, and any further details regarding trapping will gladly be supplied on application to the Sugar Experiment Station, Meringa.

A.F.B.


SOIL SURVEY MAP
OF
WOONGARRA
AND SURROUNDING
CANE LANDS
BUNDABERG
Data by N. J. KING
Scale of Chains
40 30 20 10 0 20 40 60 80 100 120 140 160 180
PACIFIC OCEAN
BURNETT RIVER
BURNETT HEADS
South Head
RED VOLCANIC LOAM
LOAM
RIVER
12 R.150

BROWN VOLCANIC LOAM
RED VOLCANIC LOAM
BROWN VOLCANIC LOAM
RED SANDY FOREST SOIL
GREY SANDY FOREST SOIL
ALLUVIAL
BROWN VOLCANIC LOAM
BURNETT
BUNDABERG
NORTH BUNDABERG
North
22
10